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(54) **A TAKE-UP STRUCTURE OF A MOWER WIRE BOX**

(57) The present invention discloses a take-up structure of a mower wire box, which comprises a wire box and a wire reel arranged in the wire box. The wire box is provided inside with a supporting portion for rotating support, with which the wire reel is matched through its shaft hole. A ratchet assembly, comprising an automatic casting assembly and a manual casting assembly, is arranged between the wire reel and the wire box. The wire reel is provided with an inner ring gear and an outer ring gear in coaxial relationship. The automatic casting assembly includes a first spring that presses a first pawl to the outer ring gear, and the manual casting assembly includes a second spring that presses a second pawl to the inner ring gear. The structure is reasonable in layout, and the relative rotation in the axial direction is based on a damping force, which is helpful to decrease friction and reduce wear of the wire reel and the casting cover caused by a large impact force at the moment of wire casting, thus prolonging the service life of the automatic casting device. In addition, two kinds of casting structures are provided, which can provide more casting methods, avoiding the problem of improper matching caused by automatic casting, improving the practicability and working stability of the structure.

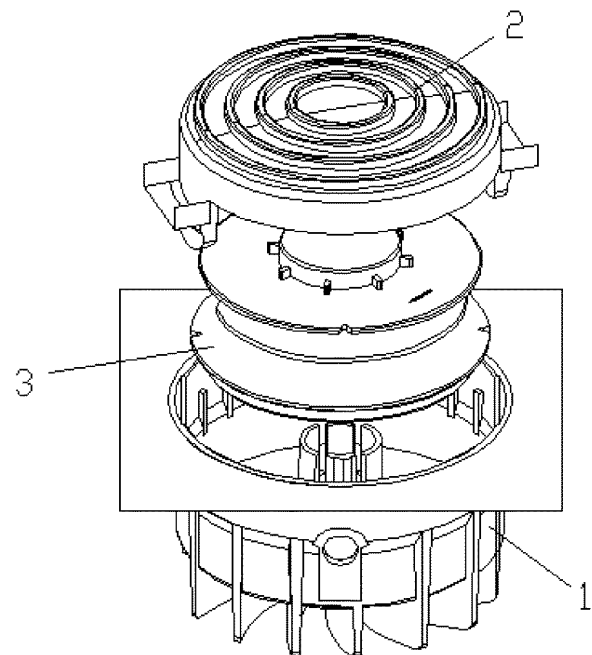


Figure 1

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Chinese Patent Application No. 201910643301.9, filed on July 17, 2019, and entitled "A take-up structure of a mower wire box", which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present invention relates to the field of mower structure, in particular to a take-up structure of a mower wire box.

BACKGROUND

[0003] A mower, also called a weeder, a lawnmower, a lawn trimmer, etc., is mainly used for mowing lawns and the like. The working head of the mower mainly comprises two parts, a motor and a mowing device. The mowing device is divided into two types, a rigid cutter head and a flexible cutting line. The cutter head uses a blade for mowing, while the flexible cutting line cuts the grass with the cutting force generated by the cutting line when it rotates at high speed. Both the blade and the cutting line will be worn out after a period of use. After being worn, the blade can be replaced, while the cutting line will become shorter. It is necessary to pull the cutting line from the wire reel to the appropriate working length for effective use. Since the cutting line may wear out faster than the blade, when the grass is cut by a mowing device with the flexible cutting line wrapped on the wire reel, the cutting line has to be pulled out frequently to ensure the working length of the cutting line and keep the best working state of the mower, which will bring great trouble to the operator.

[0004] In the prior art, an automatic casting structure is usually used to automatically extend the cutting line, which is based on the principle that the cutting line is extended out by a centrifugal force generated by the rotation of the wire reel. In the wire reel structure, the automatic casting can be realized based on the ratchet mechanism together with the damping force. However, the degree of wear of the cutting line is different during actual use. Therefore, automatic casting can only be implemented smoothly under relatively ideal wear conditions. Moreover, the durability of the structure also has a great impact on the automatic casting. Therefore, the simple automatic casting structure cannot ensure the normal casting of the mower.

SUMMARY

[0005] The technical solution of the present invention is a take-up structure of a mower wire box, which comprises a wire box, a casting cover, and a wire reel ar-

ranged in the wire box. The wire box is provided inside with a supporting portion for rotating support, with which the wire reel is matched through its shaft hole. Based on this match, the wire reel can rotate in the wire box.

[0006] A pair of elastic ribs, disposed on the peripheral wall of the supporting portion, is provided on the outer wall with a first rib extending axially. A second rib is disposed in the shaft hole of the wire reel. The elastic ribs are spread out by the centrifugal force, and the first rib and the second rib frictionally cooperate to form damping to achieve stable casting. During casting, the elastic ribs of the supporting portion are spread out by the centrifugal force, and the first rib of the elastic rib frictionally cooperates with the second rib in the shaft hole of the wire reel to form damping.

[0007] A convex shaft is protruded from a lower end surface of the wire reel, and an auxiliary rib is disposed on an outer circumferential surface of the convex shaft. Accordingly, a convex ring corresponding to the convex shaft is arranged in the casting cover, with the auxiliary rib in contact with the upper end surface of the convex ring.

[0008] A ratchet assembly, arranged on the bottom surface of the wire box, can provide one-way rotation locking for the wire reel. The ratchet assembly is divided into an automatic casting assembly and a manual casting assembly, the automatic casting assembly being based on the cooperation of the damping force and the ratchet, the manual casting assembly being realized by the mechanical transmission of the ratchet.

[0009] The wire reel is provided with an inner ring gear and an outer ring gear in coaxial relationship. The automatic casting assembly includes a first spring that presses a first pawl to the outer ring gear, and the manual casting assembly includes a second spring that presses a second pawl to the inner ring gear.

[0010] Further, the first pawl includes a curved claw; the first spring, fixed on the bottom surface of the wire box, presses the claw to the outer ring gear. When the cutting line becomes shorter due to wear, the mowing resistance is reduced, the motor speed is increased, and the corresponding centrifugal force is also increased. Under the action of the centrifugal force, the claw overcomes the elastic force of the first spring to leave the ratchet, while the wire reel will automatically rotate by one tooth under the pull of the centrifugal force of the cutting line, so that the cutting line is extended to ensure the working length thereof.

[0011] Further, a rotating shaft is fitted in the central shaft hole of the supporting portion, and a rear end of the second pawl is connected to the rotating surface of the rotating shaft; a torsion spring is disposed between the rotating shaft and the central shaft hole; a curved chute, whose length is greater than a single pitch of the inner ring gear, is arranged on the bottom surface of the wire box; a protrusion matched with the chute is disposed on the second pawl. When the automatic casting structure cannot work properly, the second pawl can be driven to

shift by the rotating shaft that is rotated. Since the rotation angle of the second pawl is limited, the second pawl can only rotate by one inner pitch. Then, with the torsion spring reset, the wire reel can be rotated forward by one inner pitch to achieve the effect of manual casting.

[0012] Further, the end of the rotating shaft is located outside the wire box, and a hexagonal surface is provided on the end of the rotating shaft to fit a manual wrench.

[0013] The present invention has the following advantages: The structure is reasonable in layout, and the relative rotation in the axial direction is based on a damping force, which is helpful to decrease friction and reduce wear of the wire reel and the casting cover caused by a large impact force at the moment of wire casting, thus prolonging the service life of the automatic casting device. In addition, two kinds of casting structures are provided, which can provide more casting methods, avoiding the problem of improper matching caused by automatic casting, improving the practicability and working stability of the structure.

BRIEF DESCRIPTION OF DRAWINGS

[0014] The present invention will be further described below with reference to drawings and examples.

Figure 1 is an assembly diagram of a mower wire box;

Figure 2 shows the structure of an automatic take-up assembly in the wire box;

Figure 3 shows the structure of a manual take-up assembly in the wire box;

Figure 4 is an upper structure view of the wire reel;

Figure 5 is a lower structure view of the wire reel; and

Figure 6 is a structural diagram of the bottom of the wire box.

[0015] List of reference numbers: 1. Wire box; 2. casting cover; 3. wire reel; 4. first pawl; 5. outer ring gear; 6. second pawl; 7. second pawl; 8. hexagonal surface; 11. supporting portion; 12. elastic rib; 21. convex ring; 31. second rib; 32. convex shaft; 33. auxiliary rib; 41. first spring; 42. claw; 61. second spring; 62. body; 63. tooth head; 64. rotating shaft; 65. torsion spring; 66. chute; and 67. protrusion.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Preferred embodiment of the present invention:

[0016] A take-up structure of a mower wire box is provided, comprising a wire box 1, a casting cover 2, and a wire reel 3 arranged in the wire box 1. The wire box 1 is provided inside with a supporting portion 11 for rotating support, with which the wire reel 3 is matched through its shaft hole. Based on this match, the wire reel 3 can rotate in the wire box 1.

[0017] A pair of elastic ribs 12, disposed on the peripheral wall of the supporting portion 11, is provided on the outer wall with a first rib 13 extending axially. A second rib 31 is disposed in the shaft hole of the wire reel 3. During casting, the elastic ribs 12 of the supporting portion 11 are spread out by the centrifugal force, and the first rib 13 of the elastic rib 12 frictionally cooperates with the second rib 31 in the shaft hole of the wire reel to form damping.

[0018] A convex shaft 32 is protruded from the lower end surface of the wire reel 3, and an auxiliary rib 33 is disposed on an outer circumferential surface of the convex shaft 32. Accordingly, a convex ring 21 corresponding to the convex shaft 32 is arranged in the casting cover 2, with the auxiliary rib 33 in contact with the upper end surface of the convex ring 21.

[0019] A ratchet assembly, arranged on the bottom surface of the wire box 1, can provide one-way rotation locking for the wire reel. The ratchet assembly is divided into an automatic casting assembly and a manual casting assembly, the automatic casting assembly being based on the cooperation of the damping force and the ratchet, the manual casting assembly being realized by the mechanical transmission of the ratchet.

[0020] The wire reel 3 is provided with an inner ring gear 7 and an outer ring gear 5 in coaxial relationship. The automatic casting assembly includes a first spring 41 that presses a first pawl 4 to the outer ring gear 5, and the manual casting assembly includes a second spring 61 that presses a second pawl 6 to the inner ring gear 7.

[0021] The first pawl 4 includes a curved claw 42. The first spring 41, fixed on the bottom surface of the wire box 1, presses the claw 42 to the outer ring gear 5. When the cutting line becomes shorter due to wear, the mowing resistance is reduced, the motor speed is increased, and the corresponding centrifugal force is also increased. Under the action of the centrifugal force, the claw overcomes the elastic force of the first spring 41 to leave the ratchet, while the wire reel will automatically rotate by one tooth under the pull of the centrifugal force of the cutting line, so that the cutting line is extended to ensure the working length thereof.

[0022] The second pawl 6, having a linear telescopic structure, includes a cylindrical body 62. The rear end of the body 62 is fixed to the rotating shaft 64, and the front end of the body 62 is fitted with a second spring 61 and a tooth head 63, with the second spring 61 pressing the tooth head 63 against the surface of the inner ring gear 7. As the surface of the inner ring gear changes, the tooth head 63 can be retracted under the deformation of the second spring 61 so as to pass over each tooth-surface highest point in the inner ring gear 9.

[0023] A rotating shaft 64 is fitted in the central shaft hole of the supporting portion 11, and a rear end of the second pawl 6 is connected to the rotating surface of the rotating shaft. A torsion spring 65 is disposed between the rotating shaft 64 and the central shaft hole. A curved chute 66, whose length is greater than a single pitch of

the inner ring gear, is arranged on the bottom surface of the wire box 1. A protrusion 67 matched with the chute is disposed on the second pawl 6. When the automatic casting structure cannot work properly, the second pawl 6 can be driven to shift by the rotating shaft 64 that is rotated. Since the rotation angle of the second pawl 6 is limited, the second pawl 6 can only rotate by one inner pitch. Then, with the torsion spring 65 reset, the wire reel can be rotated forward by one inner pitch to achieve the effect of manual casting.

[0024] The end of the rotating shaft 64 is located outside the wire box 1, and a hexagonal surface 8 is provided on the end of the rotating shaft to fit a manual wrench. The rotational position of the second pawl can be adjusted by a manual wrench. When the second pawl passes over one tooth, it will return to the original position under the action of the torsion spring, so the wire reel can be rotated for casting forward.

[0025] The above-described embodiment, not intended to limit the present invention, is merely illustrative of the principles and effects of the present invention. Those skilled in the art may modify or change the above embodiment without departing from the spirit and scope of the present invention. Therefore, all equivalent modifications or changes made by those skilled in the art without departing from the spirit and scope of the present invention will be covered by the appended claims.

Claims

1. A take-up structure of a mower wire box, comprising a wire box and a wire reel arranged in the wire box, the wire box being provided inside with a supporting portion for rotating support, the wire reel being matched with the supporting portion through its shaft hole, a ratchet assembly being arranged between the wire reel and the wire box, **characterized in that:** the ratchet assembly comprises an automatic casting assembly and a manual casting assembly; the wire reel is provided with an inner ring gear and an outer ring gear in coaxial relationship; the automatic casting assembly includes a first spring that presses a first pawl to the outer ring gear, and the manual casting assembly includes a second spring that presses a second pawl to the inner ring gear; a rotating shaft is fitted in the central shaft hole of the supporting portion, and a rear end of the second pawl is connected to the rotating surface of the rotating shaft; a torsion spring is disposed between the rotating shaft and the central shaft hole; a curved chute, whose length is greater than a single pitch of the inner ring gear, is arranged on the bottom surface of the wire box; a protrusion matched with the chute is disposed on the second pawl; the end of the rotating shaft is located outside the wire box, and a hexagonal surface is provided on the end of the rotating shaft to fit a manual wrench.

2. The take-up structure of a mower wire box according to claim 1, wherein the second pawl includes a cylindrical body, a rear end of the body being fixed to the rotating shaft, a front end of the body being provided with the second spring and a tooth head; the second spring presses the tooth head to the inner ring gear.
3. The take-up structure of a mower wire box according to claim 1 or 2, wherein the first pawl includes a curved claw; the first spring, fixed on the bottom surface of the wire box, presses the claw to the outer ring gear.
4. The take-up structure of a mower wire box according to claim 3, wherein a pair of elastic ribs, disposed on the peripheral wall of the supporting portion, is provided on the outer wall with a first rib extending axially; a second rib is disposed in the shaft hole of the wire reel; the elastic ribs are spread out by the centrifugal force, and the first rib and the second rib frictionally cooperate to form damping to achieve stable casting.
5. The take-up structure of a mower wire box according to claim 4, wherein a convex shaft is protruded from a lower end surface of the wire reel, and an auxiliary rib is disposed on an outer circumferential surface of the convex shaft.
6. The take-up structure of a mower wire box according to claim 5, wherein the wire box is provided with a casting cover, which is provided inside with a convex ring corresponding to the convex shaft, with the auxiliary rib in contact with the upper end surface of the convex ring.

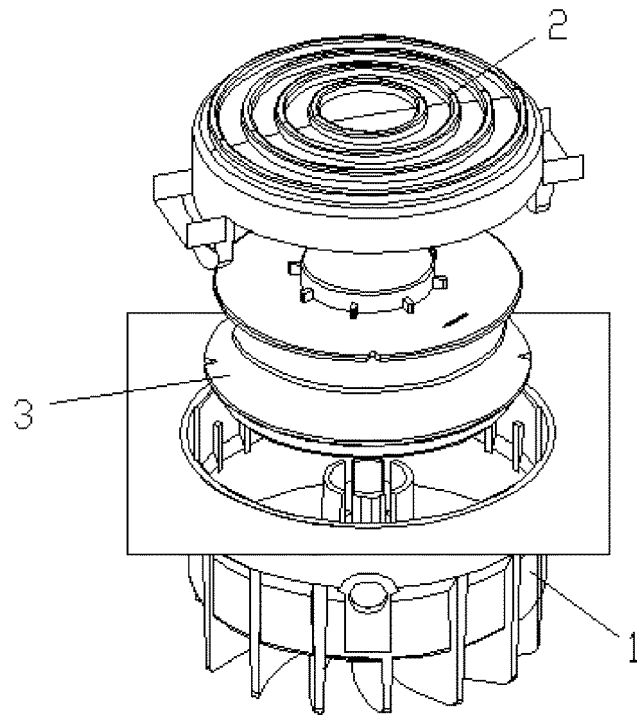


Figure 1

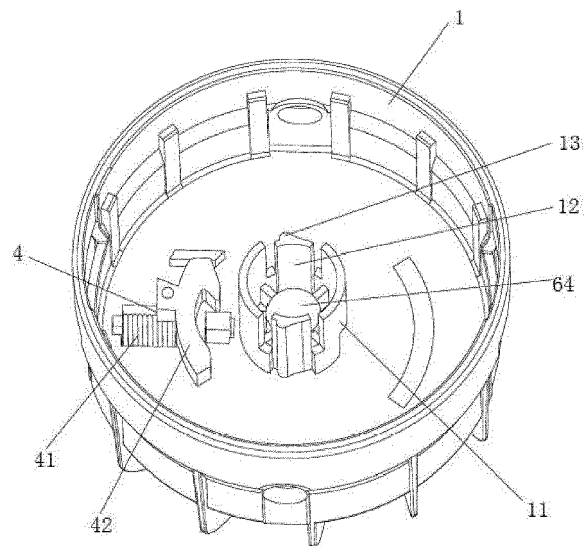


Figure 2

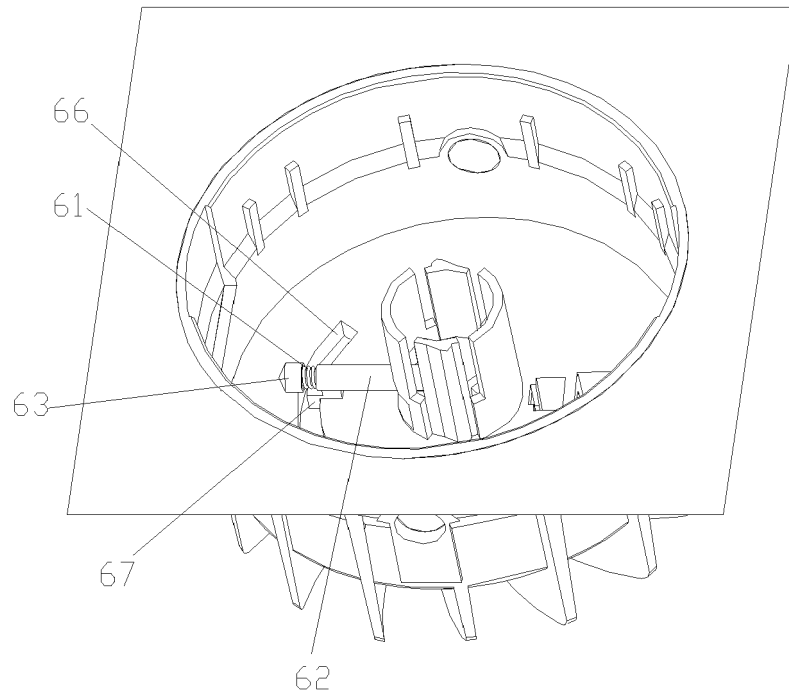


Figure 3

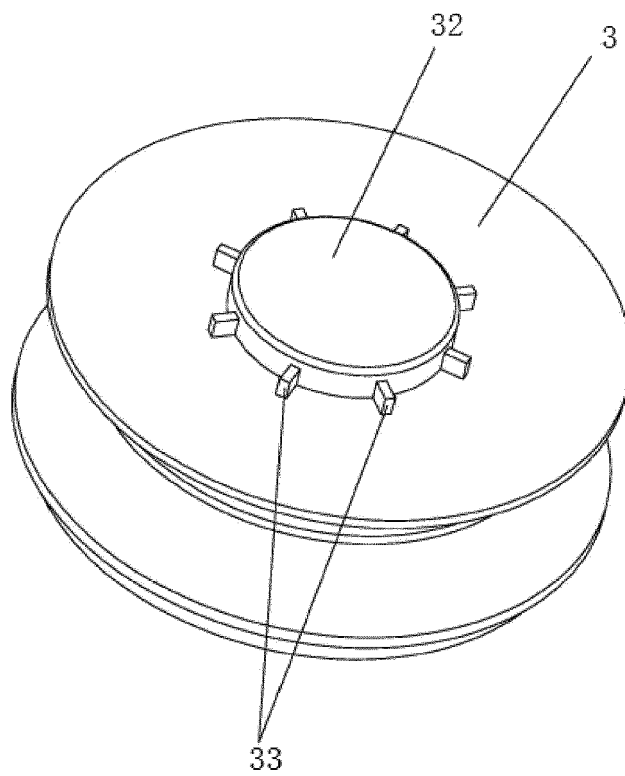


Figure 4

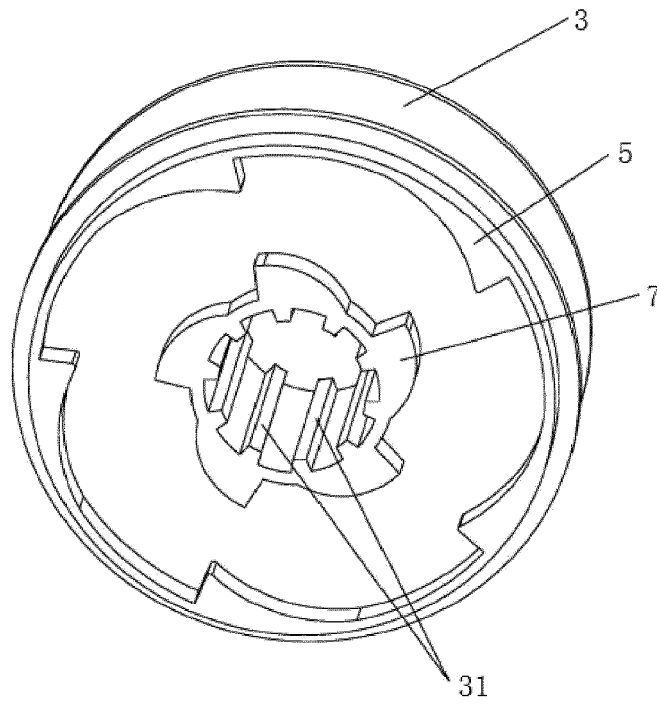


Figure 5

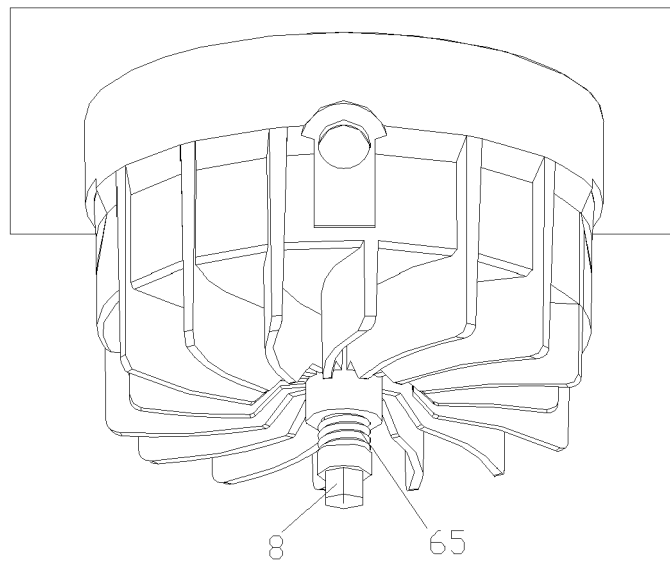


Figure 6



EUROPEAN SEARCH REPORT

Application Number
EP 19 20 4648

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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